

Amendment and Response

Serial No.: 10/034,696

Confirmation No.: 1502

Filed: December 27, 2001

For: SURVEILLANCE SYSTEM AND METHODS REGARDING SAME

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Remarks

The Office Action mailed 28 December 2004 has been received and reviewed. Claims 1-2, 4, 8-9, 12-13, 15, 19-20, 23-24, 31, 38 and 43 have been amended. Claims 3, 7, 11, 14, 18, 22, 25, and 32 have been cancelled. Therefore, the pending claims are claims 1-2, 4-6, 8-10, 12-13, 15-17, 19-21, 23-24, 26-31, and 33-43. Reconsideration and withdrawal of the rejections are respectfully requested in view of the amendments and remarks provided herein.

Claim Objections

The Examiner noted a typographical error in claim 43. Claim 43 has been amended to correctly depend from claim 42. Therefore, such objection to claim 43 is overcome.

The 35 U.S.C. §112, Second Paragraph, Rejection

The Examiner rejected claims 9, 10, 20, 21, and 24-37 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the Examiner alleges the use of the phrase "if necessary" in claims 9, 21, 24, and 31 is unclear and needs to be more fully fleshed out in the claims. Claims 10, 21, 25-30, and 32-37 were also rejected as they depend from previously rejected claims.

Claims 9, 20, 24, and 31 were amended to remove such language. As such, it is believed that these claims now overcome the rejections presented by the Examiner. It respectfully requested that such rejections be withdrawn.

The 35 U.S.C. §103 Rejection

The Examiner rejected claims 1-10, 13-21, 24-38 and 31-35 under 35 U.S.C. §103(a) as being unpatentable over Uyttendaele (U.S. Patent No. 6,701,030) in view of Kanatani ("Optimal Homography Computation with a Reliability Measure", IAPR Workshop on Machine Vision Applications, Nov. 17-19, 1998). Applicant respectfully traverses the Examiner's rejection. However, to move the case to allowance, Applicant has amended the claims to clearly distinguish

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the present invention from the cited art.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. See M.P.E.P. § 2143.

Uyttendaele describes the stitching of frames together to form a panoramic video (see column 8, lines 8-27). As indicated at column 7, lines 9-21, the system uses six cameras mounted on six faces of a cube resulting in a 360 degree by 360 degree field of view. Overlap in field of view for the cameras is described as being at least 20 percent (see column 7, lines 41-52). The stitching together process utilized in Uyttendaele is described in U.S. Patent No. 6,018,349, entitled "Patch Based Alignment Method and Apparatus For Construction of Image Mosaics" (see column 8, lines 8-27). The stitching process aligns the images using an incremental deformation of one image relative to a coordinate system and using a warping process described therein.

Kanatani ("Optimal Homography Computation with a Reliability Measure", IAPR Workshop on Machine Vision Applications, Nov. 17-19, 1998) describes an algorithm for optimally computing the homography between two given sets of points on a plane. For example, the reference computes the homography between two images (see page 428) (e.g., an image of a rectangular region and ten points in it and an image of the same region viewed from above).

Claims 1-10 and 13-21

Claim 1 describes a method for use in monitoring a search area that includes positioning a plurality of imaging devices to cover an entire search area defined by an outer perimeter edge. A plurality of frames of image pixel data are provided; wherein the plurality of frames of image pixel data include at least one frame of image pixel data representative of a corresponding field of view for each of the plurality of imaging devices. Each field of view of each imaging device

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comprises a field of view portion which overlaps with at least one other field of view of another imaging device. The plurality of frames of image pixel data are combined into a single image representative of the entire search area by computing at least one homography transformation matrix indicative of a coordinate relationship between image pixel data for fields of view of at least one pair of the imaging devices that comprise field of view portions which overlap with each other. The field of view portion which overlaps is greater than about 25 percent of the field of view of the imaging device. Further, a moving object is tracked within the single image resulting in a moving object path for the moving object. Claim 13 presents a system for use in monitoring a search area, such as for implementing a method substantially similar to the method of claim 1. As such, claim 13 includes many similar limitations and/or limitations for implementing the steps of claim 1.

Neither Uyttendaele nor Kanatani describe the positioning of a plurality of imaging devices to cover an entire search area defined by an outer perimeter edge as set forth in claims 1 and 13. Uyttendaele describes the stitching of frames together to form a panoramic video using cameras mounted on six faces of a cube resulting in a 360 degree by 360 degree field of view. As a panoramic view is desired, there is no defined search area and, clearly no positioning of cameras to specifically image the defined search area. Providing a panoramic view is much different than monitoring a defined finite search area. Kanatani, rather than defining a search area, focuses on developing the homography between two images and nothing more. Hansen et al., also cited by the Examiner, also does not describe positioning of a plurality of imaging devices to cover an entire search area defined by an outer perimeter edge.

As such, all the limitations of claims 1 and 13 are not taught or suggested in the cited references. Therefore, such claims are not obvious in view of the references cited.

Further, there is nothing in the cited references that would motivate one skilled in the art to combine the references to obtain the present invention as described in such claims. For example, a panoramic view is a much different imaging project than a defined search area. Uyttendaele describes the stitching of frames together to form a panoramic video. The stitching together process of Uyttendaele aligns the images using an incremental deformation of one image

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relative to a coordinate system and using a warping process to combine the images.

Homography requires the identification of common points in the overlapping regions. Depending on the panoramic view being imaged (e.g., a sky portion that would be likely in an outdoor 360 degree panoramic view), it would be difficult to locate planar points in order to combine images using homography as described in Kanatani (e.g., it would be difficult to find common points in a view that had little three dimensional characteristics associated therewith). With a defined search area to be monitored as described according to the present invention (i.e., defined by an outer perimeter edge), physical locations for landmarks between fields of view can be employed to generate at least one homography transformation matrix.

For at least the above reasons, one would not combine the use of homography in the generation of a panoramic view. Further, for example, overlap of only 20 percent as presented in Uyttendaele (i.e., the open ended range of at least 20 percent) would generally not be sufficient to perform homography as required by the present invention. As described in the pending application at page 19, at least 25 "percent of overlap is required to obtain several well spread landmark points in the common field of view for accurate homography."

As such, there is no teaching or suggestion in the references cited to combine the references to obtain the invention of claims 1 and 13. Therefore, such claims are not obvious in view of the references cited.

The rejection of claims 3, 7, 14, and 18 are moot in view of the cancellation of such claims.

Further, claims 2, 4, 8-9, 15, and 19-20 respectively depend on one of the independent claims (1 or 13), either directly or indirectly. Therefore, they include the limitations of the respective independent claim upon which they depend. As such, and as described above, such claims are not obvious in view of cited references for at least the same reasons as the independent claims, and it is respectfully requested that the rejection of such claims be withdrawn.

Claims 24-28, 31-35, and 38-41

Claim 24 describes a method for use in monitoring a search area that includes defining a

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search area having an outer perimeter edge, positioning a first imaging device at a first installation site such that a field of view for the first imaging device covers at least a region of the defined search area along at least a portion of the outer perimeter edge thereof, positioning one or more additional imaging devices at the first installation site to cover with fields of view thereof one or more additional regions of the defined search area not covered by the field of view of the first imaging device, and positioning one or more additional imaging devices at one or more additional installation sites to cover with fields of view thereof one or more additional regions of the defined search area not covered by fields of view of the imaging devices positioned at the first installation site. Each field of view of each imaging device includes a field of view portion which overlaps with at least one other field of view of another imaging device; the overlap being greater than about 25 percent of the field of view of the imaging device. The fields of view of the positioned imaging devices provide for coverage of the entire search area. Claim 31 describes a system for use in monitoring a search area that includes limitations similar to those of claim 24. Further, claim 38 recites a method for use in monitoring a search area that includes defining a search area with an outer perimeter edge and positioning a plurality of imaging devices at a plurality of installation sites such that corresponding fields of view for the plurality of imaging devices cover the entire defined search area.

Neither Uyttendaele nor Kanatani describe the positioning of a plurality of imaging devices to cover an entire search area defined by an outer perimeter edge as set forth in claims 24, 31, and 38. Uyttendaele describes the stitching of frames together to form a panoramic video using cameras mounted on six faces of a cube resulting in a 360 degree by 360 degree field of view. As a panoramic view is desired, there is no finite defined search area bounded by an outer perimeter edge and, clearly no positioning of cameras to specifically image the defined search area. For example, there is no positioning of a first imaging device at a first installation site such that a field of view for the first imaging device covers at least a region of the defined search area along at least a portion of the outer perimeter edge thereof as described in the pending claims, because rather, a 360 degree panoramic view is provided by Uyttendaele. In other words, the manner of positioning imaging devices in Uyttendaele is substantially different than in the

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present invention. Further, Kanatani, merely focuses on developing the homography between two images and nothing more. Hansen et al., also cited by the Examiner, does not describe positioning of a plurality of imaging devices to cover an entire search area defined by an outer perimeter edge.

The Examiner alleges that Uyttendaele creates the panoramic image and there is an upper and lower perimeter edge as a panoramic image can be considered a ring, which has two edges. The Examiner further alleges that either of such edges could be the outer perimeter edge.

However, the Examiner's application of such a contrived edge of Uyttendaele is inappropriate. The present invention is focused at monitoring a defined search area; the definition of the finite search area is bounded by an outer perimeter edge (e.g., about the perimeter of the search area). Imaging devices then are located to provide coverage of the entire defined search area. In other words, it is the search area that is defined by the outer perimeter edge and not the resultant image (e.g., panoramic image). The boundary of the defined search area according to the present invention is used to position the imaging devices. This is not the case in Uyttendaele as merely a complete ring of images to provide the 360 degree panoramic view is desired.

As such, all the limitations of each of claims 24, 31, and 38 are not taught or suggested in the cited references. Therefore, such claims are not obvious in view of the references cited.

Further, there is nothing in the cited references that would motivate one skilled in the art to combine the references to obtain the present invention as described in such claims. For example, as described in Uyttendaele, a panoramic view is provided by positioning of imaging devices about a cube. There is no need or teaching to position imaging devices at multiple installation sites as only a 360 degree panoramic view is provided about one point (e.g., all cameras are provided about one point). As such, there is no motivation to provide imaging devices at multiple installation sites.

As such, for at least the above reasons, there is no teaching or suggestion in the references cited to combine the references to obtain the invention of claims 24, 31, and 38. Therefore, such claims are not obvious in view of the references cited.

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The rejection of claims 25 and 32 is moot in view of the cancellation of such claims.

Further, claims 26-28 and 33-35 respectively depend on one of the independent claims (24 or 31), either directly or indirectly. Therefore, they include the limitations of the respective independent claim upon which they depend. As such, and as described above, such claims are not obvious in view of cited references for at least the same reasons as the independent claims, and it is respectfully requested that the rejection of such claims be withdrawn.

Although not summarily rejected on page 3 of the Office Action, claims 38-41 were individually addressed on pages 10-11 of the Office Action. Such claims are also not obvious for reasons similar to those presented above with reference to claims 24 and 31.

Claims 11-12, 22-23, 29-30, 36-37, and 42-43

The Examiner also rejected claims 11, 12, 22, 23, 29, 30, 36, 37, 42 and 43 under 35 U.S.C. §103(a) as being unpatentable over Uyttendaele in view of Kanatani as applied to claim 1 above, and further in view of Hansen (U.S. Patent No. 6,081,606). Applicant respectfully traverses the rejection.

Claims 11 and 22 were cancelled and therefore rejection of such claims is moot. However, such limitation were made a part of the independent claims upon which they depend.

Further, claims 12, 23, 29-30, 36-37, and 42-43 respectively depend on one of the independent claims (1, 13, 24, 31, and 38), either directly or indirectly. Therefore, they include the limitations of the respective independent claim upon which they depend. As such, and as described above, such claims are not obvious in view of the cited references for at least the same reasons as such independent claims, and it is respectfully requested that the rejection of such claims be withdrawn.

In addition, there is no teaching or suggestion that the motion tracking presented in Hansen et al. would be usable with an image generated based on various imaging devices output from multiple sites. The Examiner alleges that the mosaiced video of Uyttendaele would be ideal for surveillance as it can cover more search area than a single camera. However, it does not follow from such alleged disclosure that the motion tracking of Hansen et al. would be used in

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such a panoramic video created by Uyttendaele. In fact, Uyttendaele does not even address the situation of surveillance as recognized by the Examiner. As such, there is no motivation to add tracking of objects to such panoramic video creation of Uyttendaele.

Summary

It is respectfully submitted that the pending claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicant's Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper is being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this ____ day of _____, 2005, at _____ (Central Time).

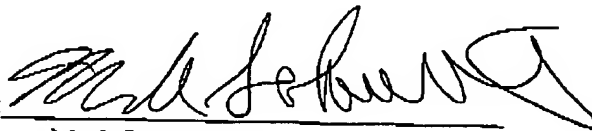
Name: _____

28 April 2005
Date

MJG/SJT

Respectfully submitted for
Ioannis PAVLIDIS

By
Mueting, Raasch & Gebhardt, P.A.
P.O. Box 581415
Minneapolis, MN 55458-1415
Phone: (612)305-1220
Facsimile: (612)305-1228
Customer Number 26813

By: 
Mark J. Gebhardt
Reg. No. 35,518
Direct Dial (612)305-1216